the viewers perception of it. It is preferable to spread the image of the sub-pixel no more than one pixel since this can over blur the image, decreasing its visibility. Since most existing technology is optimised to be viewable from all angles it is desirable to make the projection angle as small as practically possible and have the holographic diffuser at a large distance from the image formation layer, so as not to loose contrast of the overall display. Whilst the holographic diffusion pattern may be recorded using a laser and mask arrangement it can be reproduced, and indeed any diffusion pattern may be produced to within a given tolerance by many different methods. One such method is calenderending where an adhesive, usually epoxy that is curable by ultra-violet radiation, is applied to the desired surface and a 3D negative impression of the surface, on a transparent sub-strate, to be reproduced is pushed into the adhesive. The adhesive is then cured by applying the UV radiation through the substrate, and the substrate removed leaving a surface impression. Also the pattern may be applied to the surface during its manufacturing process, such as embossing the pattern onto a plastic sheet whilst the surface is still soft. It also may be applied using material removal systems such as acid or abrasion.

BRIEF DESCRIPTION OF DRAWINGS

[0066] Further aspects of the present invention will become apparent from the following description which is given by way of example only and with reference to the accompanying drawings in which:

[0067] **FIG. 1** illustrates a diagrammatic view of a pixel where the sub pixels are in the vertical stripe arrangement.

[0068] **FIG. 2** illustrates a diagrammatic view of a moiré interference pattern in where the black lines represent one colour from a stripe pattern pixel.

[0069] **FIG. 3** illustrates an oblique view of a preferred embodiment of the multi layer display.

[0070] **FIG. 4** illustrates a profile view of a preferred embodiment of the multi layer display.

[0071] **FIG. 5** illustrates an example of a sub pixel of an alternative arrangement.

[0072] **FIG. 6** illustrates the moiré interference produced by the centre blue region of a preferred embodiment.

[0073] **FIG. 7** illustrates a further alternative sub pixel arrangement for use in a preferred embodiment.

[0074] **FIG. 8** illustrates the diagrammatic representation of the moiré interference produced by the centre blue region in a preferred embodiment.

[0075] **FIG. 9** illustrates the output cone (**20**) of direc-tional diffuser (**21**) on light rays (**22**) emitted from image formation layers.

[0076] **FIG. 10** illustrates an ideal intensity profile (**25**) of a rectangular sub pixel after being blurred by diffuser, compared with the intensity distribution of sub-pixel (**24**) before being diffused by diffuser where (**25**) denotes x-axis and (**23**) denotes the horizontal axis of the image formation layer.

BEST MODES FOR CARRYING OUT THE INVENTION

[0077] **FIG. 1** illustrates a diagrammatic representation of a typical LCD panel consisting of a tessellated pixel pattern consisting of a red sub pixel (**1**), a green sub pixel (**2**), and a blue sub pixel (**3**).

[0078] **FIG. 2** illustrates a diagrammatic view of a moiré interference pattern in where the black lines represent one colour from a display layer utilising a stripe pattern pixel overlapping another display utilising a strip pattern pixel. The vertical section delimited by braces shows where the moiré pattern is most dense (**4**) and the vertical section delimited by braces shows where the interference is least dense (**5**).

[0079] **FIG. 3** illustrates a preferred embodiment of the invention being a multi-layered display composed of a backlight (**6**) lighting two image formation layers or display layers (**7**) and (**9**) both of which are (at least in part) transparent or transmissive to light and interstitial transmis-sive light diffusing films (**8**) all of which are co-linear. In a typical embodiment of a multi layer display the display layers utilise the pixel and sub-pixel arrangement illustrated in **FIG. 1** however in the preferred embodiment illustrated the display layers utilise different configurations, such that display layer **7** has tessellated pixels of the arrangement illustrated in **FIG. 1** while display layer **9** utilises the pixel arrangement illustrated in **FIG. 5** in which a centre blue sub-pixel or colour filter (**14**) is diamond in shape with straight edges and which is placed within a square and surrounded by red (**15**) and green (**16**) sub pixels which occupy the remaining area within the pixel boundaries. The resulting moiré interference from overlapping these pixel patterns (assuming that the interstitial transmissive light diffusing films have no effect on moiré interference) is illustrated in **FIG. 3** which is a diagrammatic representation of moiré interference produced by the centre blue region in this preferred embodiment. In **FIG. 6** there is less difference when compared to **FIG. 2** in density between the less dense vertical region delimited by braces (**17**) and the more dense strip delimited by braces (**18**). Preferably the pixel pattern and sub-pixel patterns utilised will be very transmissive to light.

[0080] **FIG. 7** illustrates a further alternative sub pixel arrangement where a centre blue sub pixel (**17**) with arc shaped edges is adjacent to a red sub pixel (**18**) and a green sub pixel (**19**). In a preferred embodiment the sub-pixel pattern illustrated in **FIG. 7** is utilised in a tessellated fashion on a display layer which overlaps another display layer which uses the pixel pattern illustrated in **FIG. 1** again in a tessellated fashion. The resulting moiré interference from overlapping these pixel patterns (assuming that any interstitial transmissive light diffusing films used have no effect on moiré interference) is illustrated in **FIG. 8** which is a diagrammatic representation of moiré interference pro-duced by the centre blue region where there is less difference when compared to **FIG. 2** in density between the less dense vertical region delimited by braces (**20**) and the more dense vertical region delimited by braces (**21**).

[0081] Aspects of the present invention have been described by way of example only and it should be appre-ciated that modifications and additions may be made thereto without departing from the scope thereof.